



# Improving Rehabilitation Outcomes of Overuse Tibial Bone Injuries in Initial Entry Training

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# Problem



- 1141 soldiers entered PTRP in FY03
- 80% + overuse
- 44% RTD in FY03
- Passive Rehabilitation Techniques





# Proposal



- Early intervention
- Rehabilitation program
  - Active
  - Functional
  - Individualized
- Use of Wolf's Law & CT remodeling
- Close supervision





# Theory

- Minimal inflammatory response in SFx
- Osteoblasts active early
- Safe dosage of cyclic loading
- Progressive low load forces
- Stimulate CT remodeling IAW Wolf's Law
- Better healing and increased resiliency to physical stresses





# Design

- Require sample size of 250 (1 year)
- Historical Comparison
- Match by gender and age
- Dependent Variables (functional outcomes)
  - Return to Duty rate
  - Length of Stay
- Inclusion / Exclusion criteria
  - motivated ?
  - singled injury site ?





# Wolf's Law



- Connective tissue responds to the mechanical stresses
- When stress is applied properly tissue becomes stronger
- When stress is applied improperly tissue becomes weaker





# Bone Remodeling



- Osteoclastic activity breaks down bone
- Osteoblasts respond
  - Migrate to area of mechanical strain
  - Secrete Collagen into matrix
- Mineralization of collagen
- Occurs primarily peripherally in cortical bone





# Passive Rehabilitation Approach



- Generally a “wait it out” approach
- Minimal early intervention
- Recovery left to chance
- Minimal research conducted in this area
  - Air Casting for tibial SFx
  - Capacitive coupling
  - Low intensity ultrasound





# Effects of Inactivity on Bone



- Loss of bone matrix and mineral density
- Absent stimulation of Osteoblasts
- Occurs at a faster rate than formation
- Can occur in as few as two weeks





# Active Rehabilitation



- Soldiers = Athletes
- Utilizes Wolf's Law with closed chain weight bearing
- Proprioceptive exercises
  - Reduce re-injury
  - Improve movement control & positional awareness
- Psychological benefits
- Aquatics
- Early intervention based on safety





# Preliminary Findings



- Minimal rehabilitation gym in place as of September 03
- 4<sup>th</sup> QTR FY03 vs. 1<sup>st</sup> QTR FY04 (overall)
  - 10 day reduction in stay
  - 5% increase increase in RTD





# Cost Analysis



- Rehabilitation gym already started
- Require additional 55K to for specialty equipment to rehab 250+ soldiers
- Cost of gym would be recovered with reduced attrition of one soldier!!





Questions?

